PROCEDURE 2 - Working Alone

Table of Contents: Page

Synopsis

The purpose of this procedure is to provide guidelines to employees and supervisors when additional personnel assignment may be needed. This procedure applies to all NWS facilities, work locations, and employees.

Initial Implementation Requirements:

- **Analyze Site Operations versus Requirements of the Procedure**
  - Assessment of site-specific situations/operations requiring additional personnel. *(2.3.3)*
- **Develop/Obtain Documentation/Information required for Site**
  - Develop General Rules to gauge the risks associated with each task. *(2.3.3)*
- **Designate Person to Administer Working Alone Procedure Requirements**
- **Provide Local Training of Site Personnel**
  - Safety Observer Training. *(2.3.5a,b)*
  - CPR Certification. *(2.3.2a)*
  - First Aid Training. *(2.3.2a)*
- **Inventory Material/Equipment (Procure as required)**
  - Communication Devices. *(2.3.4b)*

Recurring and Annual Task Requirements:

- **Review/Update Documentation/Information required for Site**
  - Update General Rules to gauge the potential risk associated with each task. *(2.3.3)*
- **Provide Refresher Training of Site Personnel (when required)**
  - Safety Observer Training. *(2.3.5a,b)*
  - CPR Certification. *(2.3.2a)*
  - First Aid Training. *(2.3.2a)*
- **Replace/Re-calibrate/Maintain Material/Equipment as required**
  - Communication Devices. *(2.3.4b)*

Working Alone Checklist

Requirements	EHB 15 Reference	YES	NO	N/A	Comments
Is initial and annual review of this procedure conducted and documented?	2.4.2				
Are Engineering Handbooks (EHBs) and system/equipment manuals reviewed by affected personnel for the additional personnel requirement?	2.7				
Are personnel trained in First Aid available when work is being performed in areas where there is a risk of serious injuries and medical services are not readily available (more than 8 minutes away)?	2.3.2a				
Is a Safety Observer present during all permit-required confined space entry activities?	2.3.2c				
Have all potentially hazardous conditions been evaluated by the Station Manager and/or the Environmental/Safety Focal Point and/or Program Supervisors to determine when additional personnel are necessary?	2.3.3				
Have the Station Manager and/or Environmental/Safety Focal Point established the rules for assignment of additional personnel?	2.3.3				
Have these rules been coordinated and documented?	2.3.3				
Are potentially hazardous environments routinely evaluated by the Environmental/Safety Focal point or another qualified individual prior to the commencement of operations?	2.3.3				
Are adequate communication measures in place for operations which must be performed alone?	2.3.4b				
Are Safety Observers selected and properly trained to perform their duties in accordance with this procedure?	2.3.5				
Are Safety Observers working with electrical operations trained in First Aid if medical services are not readily available?	2.3.5b				

This Page is Left Intentionally Blank

2 WORKING ALONE

2.1 Purpose and Scope

As part of its goal to provide a safe and healthful workplace, National Weather Service (NWS) Headquarters (WSH) is promulgating this procedure to provide guidelines to employees and supervisors when additional personnel assignment may be needed. This procedure applies to all NWS facilities, work locations, and employees.

2.2 Definitions

Field Office. A Field Office may include the following: Weather Forecast Office (WFO), River Forecast Center (RFC), Weather Service Office (WSO), and a Data Collection Office (DCO).

Hazardous Work. Any work that, if not properly performed, poses potential risk to the safety and health of the worker or damage to property, equipment, or the environment.

Operating Unit. For the purpose of this procedure, operating unit includes National Centers for Environmental Prediction (NCEP), National Data Buoy Center (NDBC), NWS Training Center (NWSTC), National Reconditioning Center (NRC), Radar Operations Center (ROC), and Sterling Research & Development Center (SR&DC).

Qualified Person - A person qualified by education, training, and experience to estimate employee exposures to hazardous materials and work conditions.

Station Manager. For the purpose of this procedure, the station manager shall be either the NWS Regional Director; Directors of Centers under NCEP (Aviation Weather Center, NP6; Storm Prediction Center, NP7; and Tropical Prediction Center, NP8); Directors of the NDBC, NWSTC, and Chiefs of NRC, ROC and SR&DC facilities; or Meteorologist in Charge (MIC), Hydrologist in Charge (HIC), or Official in Charge (OIC).

Working Alone. Performance of any work by an individual who is out of voice or visual contact with all other individuals. In addition to the obvious cases, employees perform work locally but still may be remote from the immediate inhabited areas of the WFO or WFO/RFC or other normally inhabited structure(s). For example, field personnel may work alone:

a. When working on the automatic radiotheodolite (ART) system in the Upper Air shelter (radome), even though it is within the WFO general area - the pedestal has voltages of 120 volts present in the slip ring assembly.

b. When working in the equipment rooms at the WFO or WFO/RFC, employees may be out of sight or hearing of workers in the operations portion of the WFO or WFO/RFC.

c. Some NRC employees may work alone in the screen room when performing certain work on the WSR-88D, working on the pedestal in the “warehouse” area, or at certain times in one or more of the laboratory areas.

d. Students at, or employees of the NWSTC may work in laboratory or classroom areas out of sight or remote from other personnel. Similar examples may also apply to national centers, regional and national headquarters.

2.3 Procedure

2.3.1 Maintenance Procedures Requiring Two or More Persons.. Material contained in the NWS maintenance manuals and Engineering Handbooks (EHB) specify when two or more maintenance personnel are required to safely perform maintenance procedures. Examples where guidance may be found include: the Doppler surveillance radar (WSR-88D), the Radar Data Acquisition (RDA) unit, antenna pedestal system, Radar Products Generator (RPG) unit, Principal User Processor (PUP) maintenance manual set, a part of EHB-6; the ART maintenance manual set, a part of EHB-9; and Real Property Installed Equipment (RPIE) maintenance manuals.

A detailed example, a summary of WSR-88D maintenance and repair operations requiring two or more maintenance persons, is presented in attachment A. It is NOT a complete listing of operations, as the list is continuously being modified and updated. It is to be used as an example only. For a complete and up-to-date listing, consult the WSR-88D maintenance manual. Some procedures mandate the presence of additional personnel to assist employees performing heavy duty work (e.g., lifting heavy equipment). Other procedures require the presence of a second employee solely as a safety observer to minimize the risk of injury to employees, as described in section 2.3.5, while other require additional personnel simply due to the nature of the work involved.

2.3.2 Specific Conditions Requiring Additional Personnel. The following additional personnel requirements are derived from OSHA regulations and interpretations.

a. In accordance with OSHA standard 1910.151, in the absence of an infirmary, clinic or hospital in near proximity to workplace, a person trained in First Aid shall be readily available.

NOTE:	OSHA provides a 8 minute response time as a guidance for determining if medical services are readily available. Nature and extent of the hazards must be evaluated for each site. If there is a risk of serious injury and medical services are more than 8 minutes away, no NWS personnel shall work alone and first aid trained employee shall be present. CPR certification and annual re-certification are recommended.

b. A safety observer must be present during all permit-required, confined-space entry activities.

2.3.3 Other Conditions that Require More than One Person. The station manager and the Safety or Environmental/Safety Focal Point, shall coordinate with site personnel to

determine and document the general rules they will use to gage the risks under which personnel will be performing their assigned tasks. Conditions such as severe weather, dangerous terrain (including areas where management determines potential risk to the employee to be unacceptably high), exposure to wild animals, exposure to hazardous chemicals, work in the open trenches, sea buoy operations, and others may dictate a need for additional personnel assignment, even if it is not required by the maintenance procedures. Potentially unsafe conditions shall be identified prior to execution of any project and brought to the attention of appropriate management personnel.

NOTE: Working on any structure that involves climbing or descending shall require a safety observer to be present unless the structure has permanent stairways and platforms with guardrails or scaffolding guards in compliance with OSHA requirements. When the structure does not have permanent stairways and platforms with guardrails or scaffolding guards and when local emergency rescue organization is not available, second person trained in rescue operations must be present.

The following paragraphs include, but are not limited to, examples of work conditions under which it is recommended that two or more people be assigned. The final decision about personnel assignment rests with the station manager, who will consider input from the Safety or Environmental/Safety Focal Point, NWS Employee Organization Representative (time permitting) and the personnel performing the work.

a. Dangerous Weather or Terrain.

(1) When working on a cliff, narrow ledges, or near vertical mountainous slopes where a loss of footing would result in serious injury or death, or when working in areas where there is danger of rock falls or avalanches.

(2) When traveling to remote sites in winter, either on foot or by means of an off-road type vehicle, over secondary or unimproved roads or snow trails, in sparsely settled or isolated areas.

(3) When working or traveling in sparsely settled or isolated areas results in exposure to dangerous temperatures and/or high winds, and when shelter, other than a temporary shelter, and assistance are not readily available.

(4) When participating in snow plowing or snow or ice removal operations, regardless of whether on primary, secondary, or other classes of roads, when there is danger of avalanche; or there is the danger of missing the road and falling down steep mountainous slopes because of lack of snow stakes, “white out” conditions, or sloping ice-pack covering the snow.

(5) When working outdoors in hot or cold weather conditions, use the guidance issued by the American Conference of Governmental Industrial Hygienists (ACGIH) for work-rest regiment in hot environment (Attachment B) and work-warming regiment in cold environment (Attachment C). Attachment B should be used for screening purposes only. It is possible that a condition may be above the criteria described in Attachment B and still not represent an unacceptable exposure.

(6) When working on river gauges that are located on the side of a bridge which is narrow and has high traffic flow or near rivers at or above flood levels.

b. Exposure to Hazardous Chemicals. Exposure to hazardous chemicals in certain amounts and concentration can present a danger to a person's life or health, especially when an accidental spill occurs. Two or more people shall be assigned when chemical concentrations could potentially exceed OSHA Permissible Exposure Limits, ACGIH Threshold Limit Values (TLVs), or 20% of a Lower Explosive Limit. The estimate of potential exposures shall be made by the Safety or Environmental/Safety Focal Point or other qualified personnel (such as an Industrial Hygienist, Safety Engineer, etc.). The National Oceanographic and Atmospheric Administration (NOAA) Regional Safety Manager (RSM) or NWS Regional/National Headquarters should be consulted, if necessary.

c. Work in Open Trenches. Working in an open trench that is 4 feet or more deep, until proper shoring, sloping, or another approved method of cave-in prevention has been installed.

d. Work Beneath Hovering Helicopter. Participating in ground operations to attach an external load to helicopters hovering overhead. The second person in the operation shall observe and remain in the view of the person attaching the load in order to signal an emergency since oral communication may not be possible due to helicopter engine or rotor noise.

e. Work in Unsafe Structures. Working within or immediately adjacent to a building or structure which has been severely damaged by earthquake, fire, tornado, flood, or similar cause. Such work may be performed if considered necessary for the safety of personnel or recovery of valuable materials or equipment, but only when the work is authorized by Regional Headquarters, and, if necessary, in conjunction with National Headquarters.

f. Exposure to Wild Animals and Poisonous Insects and Snakes. Performing maintenance in undeveloped areas if danger of encountering wild animals exists (e.g., moose, polar/brown/grizzly bears in Alaska, black bears in continental United States, large birds of prey), poisonous plants, insects or snakes.

g. Tropical Jungle Duty. Work that occurs outdoors in undeveloped jungle regions outside the continental United States can be unsafe. Work may involve the following:

(1) An unusual degree of physical hardship caused by high heat, humidity, or other inclement conditions.

(2) An unusual danger or serious injury due to:

i Travel on unimproved roads or rudimentary trails in rugged terrain (e.g., walking on narrow trails in steep mountainous areas, fording deep, fast-moving rivers, and crossing deep crevices via log or other unsafe means).

ii Immediate presence of dangerous wildlife (e.g., venomous snakes, poisonous insects, and large carnivores).

h. High Crime Areas - Work in potentially high crime areas.

i. Hoisting and Rigging Operations - Additional personnel may be required to assist as spotter(s) during some hoisting and rigging activities when visibility of the load by the operator may be compromised due to the nature of the lift.

2.3.4 Considerations Concerning Assignment of Additional Personnel.

a. When evaluating the particular situation, all factors contributing to the risk involved shall be considered. In instances when additional personnel are not readily available to support the assigned task, especially when work must be performed at remote sites or on a high structure, postponing routine maintenance task until other personnel become available and/or severe weather conditions improve should be considered.

NOTE:	In case of severe weather, travel to the work site may not be safe, even if two people are present.

b. For situations when the two-person rule is not mandatory, emergency communications (e.g., telephone, cell phone, two-way radio) for personnel who must perform emergency equipment repair alone at remote locations shall be established.

c. When means of communication are not readily available, emergency rescue measures may need to be arranged in advance.

2.3.5 Safety Observers ("Buddies"). Under special conditions, described in Section 2.3.2 and 2.3.3, when the risk of serious injury to maintenance personnel is judged to be greater than normal, the presence of a safety observer is essential. The safety observer should be able to obtain medical assistance or be trained to render first aid. In the case

of electrical work, the safety observer must be trained in CPR/First Aid. The safety observer must have immediate means of communication (e.g., phone, cellular phone, two-way radio, etc.). The following paragraphs provide the requirements applicable to safety observers.

a. Work Conditions. When work is to be performed on energized equipment or under other high risk conditions, work shall not begin until a qualified safety observer is present. A qualified safety observer may be other maintenance personnel or trained staff members (e.g., operations staff, meteorology/hydrology staff).

b. Knowledge and Training. Safety observers shall receive initial and refresher training (as appropriate). Safety observers do not have to be proficient in the task being observed, but as a minimum, should:

(1) Be briefed and/or familiar with the potential hazards of the task and be able to detect an unsafe act or condition during the work.

(2) Know how to use electrical safety equipment and be familiar with procedures to remove personnel from electrical hazards and when **not** to touch an affected person.

(3) Be trained in basic first aid for the treatment of shock, bleeding, open wounds, and burns in case if medical facility is not readily available (CPR certification and annual re-certification are recommended).

(4) Be familiar with local procedures for obtaining medical assistance;

(5) Know where disconnect switches are located and know how to de-energize equipment.

(6) Be familiar with and be able to recognize the appropriate safety controls (engineering and administrative) and to select personal protective equipment.

(7) When acting as a fire watch for welding and other hot work activities, the observer must be trained in the use of a fire extinguisher and know how to turn off bottled welding gas supplies, and secure and safely move bottled gas cylinders.

(8) The safety observer should have no responsibilities or duties other than being the safety watch.

c. Duties/Responsibilities. The safety observer should:

(1) Give positive warning of potential danger to anyone approaching the equipment.

(2) Be at a safe distance from which he/she can observe all personnel who are working on the equipment and have access to the main power switch.

(3) Have easy access to safety and rescue equipment.

(4) Provide near constant surveillance (e.g., two-way radio) or other alternative means of communication.

d. Assignment of Safety Observers. The Station Manager shall ensure that the safety observers are assigned before starting the tasks. Individuals making safety observer personnel assignments should consider splitting assignments among station staff to the extent possible.

2.4 Quality Control

2.4.1 Regional or Operating Unit Environmental/Safety Coordinators

a. Shall perform an annual assessment of the regional headquarters facilities or operating unit to monitor and promote compliance with the requirements of this procedure.

b. Shall perform assessments or designate personnel to perform assessments of all field offices to monitor and promote compliance with the requirements of this procedure every two years.

2.4.2 Station Manager

Shall review or delegate review, of this procedure on an annual basis to ensure that the facility is complying with its requirements. Confirmation of this review shall be forwarded to the Regional or Operating Unit Environmental/Safety Coordinator.

2.4.3 NWS Headquarters (WSH)

a. The NWS Safety Office shall perform an annual assessment of the NWSH facilities to ensure that the facilities are in compliance with this procedure.

b. The NWSH Safety Office shall periodically perform an assessment of the regional headquarters and field offices to ensure compliance with this procedure. The frequency of these regional and field office assessments shall be determined by the NWSH Safety Office.

c. Requests for clarification concerning this procedure shall be directed to the NWSH Safety Office.

2.5 Responsibilities

2.5.1 Regional or Operating Unit Environmental/Safety Coordinators*

Shall monitor and coordinate to promote compliance with the requirements of this procedure for the regional headquarters, and field offices or operating units.

2.5.2 Station Manager*

Shall have oversight over the implementation of this procedure and shall ensure that the requirements of this procedure are followed by individuals at the NWS facility.

2.5.3 Safety or Environmental/Safety Focal Point*

Shall ensure that any responsibilities delegated to them by the Station Manager are implemented in accordance with the requirements of this procedure.

2.5.4 Employees

a. Individual employees affected by this procedure are required to read, understand and comply with the requirements of this procedure.

b. Report unsafe or unhealthful conditions and practices to their supervisor or safety focal point.

NOTE: * Reference WSOM Chapter A-45 for complete list of responsibilities.

2.6 References

Incorporated References. The following list of references is incorporated as a whole or in part into this procedure. These references can provide additional explanation or guidance for the implementation of this procedure.

2.6.1 American Conference of Governmental Industrial Hygienists, "Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)."

2.6.2 National Weather Service, NWS Occupational Safety and Health Procedure 1, "Fall Protection."

2.6.3 National Weather Service, NWS Occupational Safety and Health Procedure 12, "Confined Space Entry."

2.6.4 U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR 1910, Subpart Z, "Toxic Substances."

2.7 Attachments

Attachment A. Table 2-1: Equipment Maintenance Procedures That Require More Than One (1) Person.

NOTE: Attachment A contains **examples** from NEXRAD manuals (EHB-6). It is provided as a guide only. The latest approved EHBs and system/equipment manuals must be used for equipment-specific guidance. It is appropriate to caution that there is no ultimate

guarantee that errors and omission in documentation have been completely eradicated. Common sense and sound judgement should be applied in each and every decision process.

Attachment B. Screening Criteria for Heat Stress Exposure (WBGT Values)

Attachment C. TLVs Work/Warm Up Schedule for Four-Hour Shift

ATTACHMENT A

Equipment Maintenance Procedures That Require More Than One (1) Person

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
EHB 6-510 RDA Maintenance Group	Chapter 6 Maintenance	Safety Summary	2	Do not Service or Adjust Alone. Under no circumstances should any person reach into or enter an enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.
			2	UD5A7 is heavy. Two technicians are required to support the unit during removal and installation.
			2	Two people are required to safely perform step 8 (page 6 4120).
			2	Power supplies are heavy. Two technicians are required to support the power supplies during both removal and installation procedures.
			2	Unit 5A12 is heavy. Two technicians are required to support the unit during removal and installation.
	6.5 Replacement and Setup Procedures	Para.6.5 Replacement and Setup Procedures	2	After 6.5.3, Table 6-5.3 RDA Group Turn-On Procedure Two people are required to safely perform the stow pin procedure.
		6-5.45 Pedestal/Power Amplifier Unit UD5A7 Replacement Procedure	2	Two technicians are required for this procedure. UD5A7 is heavy. Two technicians are required to support the unit during removal and installation.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
EHB 6-510 RDA Maintenance Group	6.5 Replacement and Setup Procedures	6-5.46 - Elevation/ Azimuth Power Amp UD5A7A1 and UD5A7A2 Replacement	2	UD5A7 is heavy. Two technicians are required to support the unit during removal and installation.
		6-5.53.1. Elevation Manual Drive Assembly UD2A1A1A1 Replacement Procedure	2	6.-5.53 - Antenna Pedestal UD2 LRU Replacement Information Two technicians are required for this procedure.
			Implied	Under Warning in sub-para. 6-5.53.1.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."
		6-5.53.2 - Elevation Manual Drive Stow Pin Switch UD2A1A1A1S1 Replacement	2	Two technicians are required for this procedure.
			Implied	Under Warning in sub-para. 6-5.53.2.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."
		6-5.53.3 - Elevation Data Package UD2A1A1A2 Replacement	2	Two technicians are required for this procedure.
			Implied	Under Warning in sub-para. 6-5.53.3.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
		6-5.53.4 - Elevation Gearbox UD2A1A1A3 Replacement	3	Three technicians are required for this procedure.
EHB 6-510 RDA Maintenance Group	6.5 Replacement and Setup Procedures	6-5.53.4 - Elevation Gearbox UD2A1A1A3 Replacement	Implied	Under Warning in sub-para. 6-5.53.4.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."
			3	Under 6-5.53.4.3.24, Notes: Three people are required to safely remove and replace the gearbox/drive motor.
		6-5.53.5 - Elevation Gearbox Drive Motor UD2A1A1B1 Replacement	2	Two technicians are required for this procedure.
			Implied	Under Warning in sub-para. 6-5.53.5.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."
			2	Under 6-5.53.5.38, Notes: Two people are required to safely remove and replace the drive motor.
		6-5.53.6 - Elevation Stowe Pin Switch UD2A1A1S1/S2 Replacement	2	Two technicians are required for this procedure.
			Implied	Under Warning in sub-para.. 6-5.53.6.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
		6-5.53.7 - Azimuth Manual Drive Assembly UD2A1A3A1 Replacement Procedure	2	Two technicians are required for this procedure.
EHB 6-510 RDA Maintenance Group	6.5 Replacement and Setup Procedures	6-5.53.8 - Azimuth Manual Drive Interlock Switch UD2A1A3A1S1 Replacement Procedure	2	Two technicians are required for this procedure.
		6-5.53.9 - Azimuth Data Package UD2A1A3A2 Replacement Procedure	2	Two technicians are required for this procedure.
		6-5.53.10 - Azimuth Gearbox UD2A1A3A3 Replacement Procedure	4	Four technicians are required for this procedure.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
EHB 6-510 RDA Maintenance Group	6.5 Replacement and Setup Procedures		Implied	Under Warning in sub-para. 6-5.53.10.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."
			3	Under Warning in subpara. 6-5.53.10.3.35, three people are required to safely guide the gearbox/drive motor through the azimuth access door and to the floor.
		6-5.53.11 - Azimuth Gearbox Drive UD2A1A3B1 Replacement Procedure	2	Two technicians are required for this procedure.
			2	Under Note in subpara. 6.5-53.11.3.6, two people are required to safely remove and replace the drive motor.
		6-5.53.12 - Azimuth Stow Pin Switch UD2A1A3S2 Replacement Procedure	2	Two technicians are required for this procedure.
			Implied	Under Note in subpara. 6.5-53.12.3, Another technician must climb into the azimuth housing and assist in removing and replacing the stow pin switch.
		6-5.53.13- Receiver Protector UD2A3 and UD2A7 Replacement Procedure	3	Three technicians are required for this procedure.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
EHB 6-510 RDA Maintenance Group	6.5 Replacement and Setup Procedures	6-5.53.14 - Low Noise Amplifier (LNA) UD2A4 and UD2A8 Replacement Procedure	2	Two technicians are required for this procedure.
			Implied	Under Warning in subpara. 6-5.53.14.2.3, "The technician who climbs the ladder is responsible for putting on the safety harness and hooking it to a safe secure position prior to ascending the 20-foot ladder."
		6-5.53.15 - Main Bearing Oil Sensor UD2A1A3RT2 Replacement Procedure	2	Two technicians are required for this procedure.
		6-5.53.16 - Rotary Joint Replacement Procedure	2	Two technicians are required for this procedure.
		6-5.53.17 - Slip Ring Replacement Procedure	3	Three technicians are required for this procedure.
		6-5.53.17 - Slip Ring Replacement Procedure	3	Under Note in subpara. 6.5-53.17.3.2, Three technicians are required for the next step, two technicians inside the lower pedestal housing and one outside the pedestal housing.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
		6-5.55 Waveguide Pressurization Unit UD6 Replacement Procedure	2	Two technicians are required for this procedure.
		6-5.60 Power Supplies UD5PS5/PS6 Replacement Procedure	2	Two technicians are required for this procedure.
		6-5.64 CPU Chassis Fan Assembly UD5A15B1-B4 Replacement Procedure	2	Two technicians are required for this procedure.
		6-5.72 Spectrum Filter Replacement Procedure	2	Two technicians are required for this procedure.
		6-6.15 RDA Maintenance Procedures Initial Setup	2	Under Note in subpara. 6-6.15.3.5, two people are required to perform steps c and d.
	6.6 Alignment and Adjustment Procedures	6-6.17 Azimuth/ Elevation Encoder Alignment	2	Subpara 6-6.17.2.2 Initial/Preliminary Setup. Radome technicians (2) remain in radome.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
EHB 6-510 RDA Maintenance Group	6.6 Alignment and Adjustment Procedures	6-6.18 Elevation Pre-limit and Final Limit Switch Adjustment (Alignment) Procedures	2	Under Note in subpara. 6-6.18.3 , two technicians should remain in the radome area using this procedure.
		6-6.12. Clogged Filter Indicator Alignment	2	Two radar technicians are required in the RDA Equipment Shelter UD1.
		6-6.28 Receiver/Signal Processor Calibration	3	Three technicians are required to perform Part I; two in the radome, and one in the RDA equipment shelter.
EHB-6-511	Operations and Maintenance Instructions Transmitter System	preamble	Other	Do Not Service or Adjust Alone Under no circumstances should any person reach into or enter any high power transmitter enclosure for the purpose of servicing or adjusting the equipment, except in the presence of someone who is capable of rendering aid.
		Subpara. 7.6.2.1 Isolation Transformer To	2	Requires 2 people to handle an 80 lb. transformer.
EHB 6-514	WSR-88D Pedestal System	Overall Safety Summary	Other	Advises technicians not to reach into an enclosure in order to service or adjust equipment except in the presence of someone capable of rendering aid.
		Warnings	Other	When performing maintenance requiring equipment to be energized, use extreme cautions. Observe safety precautions and always have a second person present.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
		Warnings	2	Two persons are required to raise the gearbox properly into the mating pilot.
			2	Two persons are required to install waveguide components, associated bracketry, and attaching hardware.
EHB 6-514	WSR-88D Pedestal System	2-4.4.1.3.5 Procedure (Redundant Linear Polarization Installation)	2	Subpara 3.a under CAUTION Two persons are required to perform the pre-installation procedure due to various component weights.
			3	Subpara 6.a, Under WARNING, a third person is required to assemble heavy and pre-assembled units
		3.6 Digital Control Unit Maintenance	2	Under WARNING, When performing maintenance requiring equipment to be energized, use extreme caution. Voltages are present that can cause severe injury or death. Observe safety precautions and always have a second person present.
EHB 6-550	Real Property Installed Equipment (RPIE) WSR-88D	Safety Summary	Other	Under Do Not Service or Adjust Alone, Under no circumstances should any person reach into or enter an enclosure for the purpose of servicing or adjusting the equipment except in the presence of some one who is capable of rendering aid.
			2	Under Antenna Pedestal, Warnings, (page xvii), two technicians are required to remove the exhaust fan cover. Failure to use two technicians to remove the cover could result in serious injury. Also failure to perform power-down procedures for the damper assembly could cause serious injury or death (3-47).

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
			2	Under Antenna Pedestal, Warnings, (page xvii), two technicians are required to safely perform steps 3 through 21. Failure to comply with this caution can cause serious injury. (Page 3-127)
		3-3.2 RPIE Maintenance Procedures	2	3-3.2. Air Conditioner Control Circuitry Troubleshooting. This procedure requires two technicians.
			2	3-3.2.2 Radome Venting Circuitry Troubleshooting. This procedure requires two technicians.
EHB 6-550	RPIE WSR-88D	3-3.2 RPIE Maintenance Procedures	2	3-3.2.6 Security Panel Alarm Circuitry (UD7A12) Troubleshooting. This procedure requires two technicians.
		3-4 Servicing (Preventive Maintenance)	2	3-4.1 Air Conditioner Drain Hoses, Coil, and Filter Inspect and Clean (UD7AC1 and UD7AC2). The purpose of this procedure is to inspect and clean the air conditioner drain hoses, coil, and filter. This procedure requires two technicians.
			2	3-4.2 Micro 1 EV or Junior Fire Control System Inspection and Cleaning (UD7A5). The purpose of this procedure is to inspect and clean the Micro 1 EV or Junior Fire Control System. This procedure requires two technicians.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
			2	3-4.4 Generator Assembly Inspection, Cleaning, and Servicing (UD10MG1). The purpose of this procedure is to provide for the inspection, cleaning, and service routines for the generator assembly. This procedure requires two technicians. Refer to NWS EHB 6-551-5 and 6-551-9 for additional information.
			2	3-4.5 Check Battery Charging System (UD10A1A6). The purpose of this procedure is to ensure that the battery charging module UD10A1A6 is operating correctly. This procedure requires two technicians.
			2	3-4.6 Inspect and Clean Motorized Damper Assembly. The purpose of this procedure is to ensure that the damper assemblies and associated equipment are clean and maintained in an operational condition. This procedure requires two technicians.
			2	3-4.7 Clean and Inspect Generator Assembly (UD10). This procedure requires two technicians.
EHB 6-550	RPIE WSR-88D	3-4 Servicing (Preventive Maintenance)	2	3-4.8 Generator Assembly (UD10) - Change Crankcase Oil. This procedure requires two technicians. Refer to NWS EHB 6-551, page 17 for additional information.
			2	3-4.9 Check Equipment Shelter and Generator Shelter Grounding. This procedure requires two technicians.
			2	3-4.10 Air Conditioner - Freon Leak Test. This procedure requires two technicians.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
			2	3-4.12 Dayton Wall Heater (ADHERE) - Clean Perforated Grill. This procedure requires two technicians.
			2	3-4.14 Fire Suppression System - Performance Check. This procedure requires two technicians.
			2	3-4.16 Dayton Wall Heater (ADHERE) - Lubrication of Generator Shelter Heater Fan Motor Bearings. This procedure requires two technicians.
		3-5 Removal and Replacement Procedure	2	3-5.3.1 Circuit Breaker, Power Distribution Panel (UD7A2) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.2 Circuit Breaker, Power Distribution Panel (UD7A3) Removal/Replacement. This procedure requires two technicians.
EHB 6-550	RPIE WSR-88D	3-5 Removal and Replacement Procedure	2	3-5.3.3 Printed Circuit Board, Micro 1 EV (UD7A5A1) Removal/Replacement). This procedure requires two technicians.
			2	3-5.3.4 Transformer, Micro 1 EV or Junior (UD7A5T1) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.5 Solenoid Pilot Valve Assembly UD7A8A1 Removal/Replacement. This procedure requires two technicians. Refer to NWS EHB 6-551-3 for parts location.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
			2	3-5.3.7 Trip Switch, Contractor Coil (UD7S2) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.8 Evaporator Fan Motor (UD7AC1B1) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.9 Condenser Fan Motor UD7AC1B2 Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.10 Evaporator Fan Motor (UD7AC2B1) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.11 Evaporator Fan Motor (UD7AC2B2) Removal/Replacement. This procedure requires two technicians.
EHB 6-550	RPIE WSR-88D	3-5 Removal and Replacement Procedure	2	3-5.3.12 Accessory Control Panel (UD10A1A1) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.13 Signal Module (UD10A1A2) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.14 Exerciser Clock (UD10A1A3) Removal/Replacement. This procedure requires two technicians.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
			2	3-5.3.15 Power Sentry Module (UD10A1A4) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.16 Voltage Sensing Module (UD10A1A5) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.17 Battery Charger (UD10A1A6) Removal/Replacement. This procedure requires two technicians.
			2	3-5.3.18 Program Transition Module (UD10A1A8) Removal/ Replacement. This procedure requires two technicians.
			2	3-5.3.19 Relay (UD10A2K1) Removal/Replacement). This procedure requires two technicians.
			2	3-5.3.20 Relay (UD10A1K2) Removal/Replacement). This procedure requires two technicians.
			2	3-5.3.21 Relay (UD10A1K3) Removal/Replacement). This procedure requires two technicians.
EHB 6-550	Real Property Installed Equipment (RPIE) WSR-88D	3-5 Removal and Replacement Procedure	2	3-5.3.22 Circuit Breaker, Power Distribution Panel (UD10A2) Removal/ Replacement. This procedure requires two technicians.
			2	3-5.3.23 Generator Fuel Level Assembly (UD10A6MT1) Removal/ Replacement. This procedure requires two technicians.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
			2	3-5.3.24 Damper Motor Actuator (UD11A1B1)) Removal/ Replacement. This procedure requires two technicians.
			2	3-5.3.25 Motor, Radome Fan (UD11A2B1) Removal/ Replacement. This procedure requires two technicians.
			2	3-5.3.26 Vent Fan Assembly (UD11A2) Removal/ Replacement. This procedure requires two technicians.
			2	3-5.3.27 Circuit Breaker, Microwave Line of Sight (MLOS) Power Distribution Panel (UD13A1) Removal/ Replacement. This procedure requires two technicians.
			2	3-5.3.28 Air Conditioners Discharge Air Temperature Sensors (UD7A18, UD7A19) and Transmitter Exhaust Air Temperature Sensor (UD7A21) Removal/ Replacement. This procedure requires two technicians. This procedures is in two parts. Part 1 is for UD7A18 and UD7A9. Part 2 is for UD7A21.
			2	3-5.3.29 Interior (Room) Air Temperature Sensor (UD7A20 and UD10A7) Removal/ Replacement. This procedure requires two technicians. For component location refer to NWS EHB 6-501, IPB Manual.
EHB 6-550	RPIE WSR-88D	3-5 Removal and Replacement Procedure	2	3-5.3.30 Exterior Air Temperature Sensor (UD7A22) Removal/ Replacement. This procedure requires two technicians. For component location refer to NWS EHB 6-501, IPB Manual.

Table 2-1: Equipment Maintenance Procedures That Require More than One (1) Person

Tech Manual (TM)	TM Chapter #	Reference	Number of Technicians Required	Statements from Procedure
			2	3-5.3.31 Aircraft Warning Light (UD12A1) Removal/ Replacement. This procedure requires two technicians. For component location refer to NWS EHB 6-501, IPB Manual.
		3.6 Alignment and Adjustment Procedures	2	3-6.4 Clogged Filter Indicator Adjustment. This procedure provides instructions to clean or replace the air intake filters and adjust the Clogged Filter Indicators, UD7A14, A15, and A16 for the Equipment Shelter Air Conditioners, UD7AC1 and UD1AC2, and the Transmitter UD3. This procedure requires two technicians.
		Appendix A Micro Junior Control Panel Fire Suppression Data	2	A-1.1 Fire Suppression System - Performance Check. This procedure requires two technicians.
			2	A-1.2 Battery (UD7A5BT1, BT2) - Perform Battery Load Test. This procedure requires two technicians.
			2	A-1.3 Printed Circuit Board, Micro Junior (UD7A5A1) Removal/ Replacement. This procedure requires two technicians.

ATTACHMENT B

Screening Criteria for Heat Stress Exposure (WBGT values)

(ACGIH, 2001 TLVs and BEIs)

	LIght		Moderate		Heavy		Very Heavy	
Hourly Activity	Unacclimatized	Acclimatized	Unacclimatized	Acclimatized	Unacclimatized	Acclimatized	Unacclimatized	Acclimatized
100% Work	27.5	29.5	25	27.5	22.5	26.0	21.0	25.0
75% Work 25% Rest	29.0	30.5	26.5	28.5	24.5	27.5	22.5	26.5
50% Work 25% Rest	30.0	31.5	28.0	29.5	26.5	28.5	25.0	27.5
25% Work 75%Rest	31.0	32.5	29.0	31.0	28.0	30.0	26.5	29.5

Notes:

- WBGT values are expressed in ^{0}C and are rounded to the nearest half degree.
- Work and rest environments are assumed to be the same. When they are different, hourly time-weighted averages (TWA) should be calculated and used. TWAs for work rates should also be used when they vary within the hour.
- Values in the table are applied by reference to the "Work-Rest Regimen" section of the *Documentation* and assume 8-hour work days in a 5-day work week with conventional breaks as discussed in the *Documentation*. When work days are extended, consult the "Application of the TLV" section of the Documentation.

* - TLVs - Threshold Limit Values

This Page is Left Intentionally Blank

ATTACHMENT C

TLVs* Work/Warm Up Schedule for Four-Hour Shift

(ACGIH, 2001 TLVs and BEIs)

Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph wind		15 mph wind		20 mph wind	
^{0}C (approx.)	^{0}F (approx.)	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks	Max Work Period	No. of Breaks
-26^0 to -28^0	-15^0 to -19^0	(Norm. Breaks) 1		(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4
-29^0 to -31^0	-20^0 to -24^0	(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4	30 min	5
-32^0 to -34^0	-25^0 to -29^0	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35^0 to -37^0	-30^0 to -34^0	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38^0 to -39^0	-35^0 to -39^0	40 min	4	30 min	5	Non-emergency work should cease					
-40^0 to -42^0	-40^0 to -44^0	30 min	5	Non-emergency work should cease							
-43^0 & below	-45^0 & below	Non-emergency work should cease									

Notes:

1. Schedule applies to any 4-hour work period with moderate to heavy work activity, with worm-up periods of ten (10) minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4-hour period in a warm location. For light-to-moderate work (limited physical movement): apply schedule one step lower. For example, at -35^o C (-30^o F) with no noticeable wind (step 4),

a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (step 5).

2. The following is suggested as a guide for estimating wind velocity if accurate information is not available:
   5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.

3. TLVs apply only for workers in dry clothing.

* - TLVs - Threshold Limit Values